



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/034,596	12/28/2001	Peter Van Buskirk	441	8197

25559 7590 04/21/2004

ATMI, INC.
7 COMMERCE DRIVE
DANBURY, CT 06810

EXAMINER

OWENS, DOUGLAS W

ART UNIT	PAPER NUMBER
----------	--------------

2811

DATE MAILED: 04/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/034,596

Applicant(s)

BUSKIRK, PETER VAN

Examiner

Douglas W Owens

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 11-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1 – 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. The terms "substantial magnetic permeability" and "substantial dielectric permeability" in claims 1, 4, 8 and 10 are relative terms which render the claims indefinite. The term "substantial" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

4. Claim 2 recites the limitation "...said first insulating layer..." in line 3. There is insufficient antecedent basis for this limitation in the claim. It is not clear which insulating layer the claim is drawing reference to.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Art Unit: 2811

6. Claims 1 – 3, 5, 6 and 8 – 10, as far as indefinite claims can be understood, are rejected under 35 U.S.C. 102(e) as being anticipated by US patent No. 6,329,234 to Ma et al.

Regarding claims 1, 8, 9 and 10, Ma et al. teaches a method of making a passive transmission line device (Fig. 11), comprising:

forming a recess insulating layer (30) having a top and bottom surface;

forming a recess in the recess insulating layer by a damascene process (Col. 8, lines 18 - 27);

forming an enhancement layer (60; Col. 7, line 24) covering the walls and bottom surface of the recess;

said enhancement layer having substantial dielectric permeability; and

forming a conductive line (90) over the enhancement layer, etching over the top surface of the conductive line so that conductive material does not extend laterally beyond the recess (Col. 8, lines 23 - 31), wherein the etch is done by CMP.

Regarding claim 2, Ma et al. teaches a method, wherein the upper surface of the conductive line is coplanar with the upper surface of a first insulating layer.

Regarding claim 3, Ma et al. teaches a method, wherein the upper surface of the conductive line is coplanar with an upper surface of the enhancement layer.

Regarding claim 5, Ma et al. teaches a method, wherein the recess insulating layer is formed on a first insulating layer (20) having a top and bottom surface.

Regarding claim 6, Ma et al. teaches a method, wherein the first insulating layer includes at least one via extending there through and a conductive plug (16) fills the via

(see left side of device in Fig. 11).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al.

Ma et al. does not teach a method, wherein a second enhancement layer is formed over the conductive line. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a second enhancement layer, such as silicon nitride, for the purpose of providing a passivation layer, since it is desirable to protect the structure.

Response to Arguments

9. Applicant's arguments filed January 29, 2004 have been fully considered but they are not persuasive.

10. Applicant argues that the specification provides some standard for measuring the degree intended by the phrases "substantial magnetic permeability" and "substantial dielectric permeability" asserting that the standard can be found on pages 14 and 15.

The material on page 14 relied upon for support states, "...**illustrative high permeability materials** in accordance with the practicing the present invention include **any suitable material** having a relative **permeability of at least about 2**, and **advantageously more than about 10**" (emphasis added). The specification further

states on page 15, that the dielectric constant can be "...**at least about 7**, and advantageously **more that about 15 or 20...**" (emphasis added), and goes on to say that this is comparison to low k insulators, such as silicon dioxide and silicon nitride. Silicon dioxide and silicon nitride have a dielectric constant in the range of 4 to 7, as admitted by Applicant. According to page 14, a dielectric constant of at least 2 is suitable and considered to be a high permeability material, which would include typical interlayer insulators, such as SiO and SiN. However, the following page prohibits the use of these materials. Additionally, the possible range of the dielectric permeability on page 14 seems to be anywhere from 2 to above 10, while on page 15, the range must be from 7 to somewhere higher than 15 or higher than 20. The Examiner cannot ascertain what the intended measure of degree of "substantial dielectric permeability" could be.

11. Applicant argues that the enhancement layer (60) does not meet the claim limitation because it does not have substantial dielectric permeability. The silicon nitride layer enhancement layer taught by Ma et al. would have had a dielectric constant in the range of 4 to about 7. According to Applicant's disclosure, a dielectric material having relative permeability in this range is suitable for carrying out the invention. Specifically, page 14 of Applicant's disclosure states that a suitable material with a relative permeability of at least 2 can be used. Additionally, the term substantial is defined in Merriam-Webster's Collegiate Dictionary as a: consisting of or relating to substance b: not imaginary or illusory. The enhancement layer taught by Ma et al. meets this limitation.

12. With respect to including a second enhancement layer, though not explicitly stated in Ma et al., one having ordinary skill in art would understand that copper is subject to oxidation and can be easily damaged if left exposed. The passivation layer is required to protect the device from premature failure. Materials such as silicon nitride are common passivation/enhancement layer materials. As discussed above, such a layer would have substantial dielectric permittivity.

Conclusion

13. This application contains claims 11 – 21 drawn to an invention nonelected with traverse in the paper filed August 6, 2003. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W Owens whose telephone number is 571-272-1662. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DWO



SPE TC 2800